

**FACT SHEET FOR NPDES
PERMIT NO. WA-000370-1**

SANDVIK SPECIAL METALS

SUMMARY

The Sandvik Special Metals Corp. plant is a zirconium and titanium tube forming, annealing, and surface finishing facility. Large diameter tubing is repeatedly reduced to ever-smaller diameters, etched with hydrofluoric acid, cleaned and annealed to high-grade product required in the preparation of nuclear fuel rods, high-grade aircraft systems, and sporting equipment.

The facility discharges approximately 250,000 gallons per day of industrial wastewater to the Columbia River. Approximately 20% of the discharge volume is process wastewater consisting of neutralized acids and alkaline rinse waters; the remainder is non-contact cooling water.

During the previous permit cycle, from 1998 to 2003 the facility was generally in compliance with the conditions of its discharge permit. The Department Issued a Permit Modification effective February 1, 2002 to the previous permit in which these change were incorporated:

- Establishment of ammonia, temperature and pH final effluent limitations;
- Authorization of mixing zones; and
- Revision of submittal date requirements.

The Permittee has submitted lowered production estimates for the forthcoming permit term, effectively lowering the effluent limits via the production-based performance (BAT and BPT) standards established in 40 CFR 471.62 & 471.61 for Titanium and 471.92 & 471.91 for Zirconium.

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INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), which is administered by the Environmental Protection Agency (EPA). The EPA has delegated responsibility to administer the NPDES permit program to the State of Washington (State) on the basis of Chapter 90.48 RCW which defines the Department of Ecology's (Department) authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the State include procedures for reissuing permits (Chapter 173-220 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be reissued before discharge of wastewater to waters of the State is continued. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the proposed permit. One of the requirements (WAC 173-220-060) for reissuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least thirty days before the proposed permit is issued/reissued (WAC 173-220-050). The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of the fact sheet for more detail on the Public Notice procedures).

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in this review have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the proposed permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Comments and the resultant changes to the proposed permit will be summarized in Appendix C -- Response to Comments.

GENERAL INFORMATION	
Applicant:	Sandvik Special Metals Corporation
Facility Address:	43507 S. Piert Road Finley, WA 99337
Type of Facility:	Zirconium and titanium tube manufacturing facility
SIC Code:	3356
Discharge #001 Location:	Latitude: 46° 08' 46" N Longitude: 119° 00' 08" W
Water Body Name and ID Number:	Waterbody Name: Columbia River Waterbody ID Number: WA-CR-1028, NN57NG

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

The Sandvik Special Metals Corp. plant is a zirconium and titanium tube forming, annealing, and surface finishing facility. Large diameter tubing is repeatedly reduced to ever-smaller diameters, etched with acids, cleaned and annealed to high-grade product required in the preparation of nuclear fuel rods, high-grade aircraft systems, and sporting equipment.

Industrial Process

This facility reduces the size of titanium and zirconium tubing through a cold pilgering process. Since the reduction process is repetitive, the same pound of metal stock will see several reduction operations before reaching final size. After each size reduction the tubes are cleaned with an alkaline soap solution and rinsed; etched with a nitric-hydrofluoric acid mixture and rinsed; and heat treated, before advancing to the next size reduction. Some product sizes will see only one or two reductions, while others may see as many as six.

Incoming tubing is approximately 2.5 inches in diameter, with a surface-to-mass ratio of 20 square inches per pound for zircaloy, and 29 square inches per pound for titanium. The final product has a surface area-to-mass ratio of approximately 300 square inches per pound for zircaloy and 450 square inches per pound for titanium.

Wastewaters Generated

Sandvik Special Metals is the holder of Storm Water Baseline General Permit No. SO3-000518. Therefore stormwater discharges are not addressed in the proposed permit.

Sandvik Special Metals discharges approximately 250,000 gallons per day (gpd) of industrial wastewaters to the Columbia River. The permit application groups wastewaters generated by this facility into three types. They are:

1. non-contact cooling water,
2. spent etching acid, acidic rinse water, spent alkaline cleaning solution, rocker coolant, and
3. alkaline rinse water.

1. Non-contact cooling water

Non-contact cooling water from the heat treating furnaces, acid tank heat exchangers, and compressors is the largest wastewater stream, accounting for approximately 200,000 gpd, or 80 percent of the plant discharge. There are no chemical additives in this cooling water. This discharge is often warmer than the receiving water, but usually below 32° C.

2. Etching acid, acidic rinse water, spent alkaline cleaning solution, and rocker coolant

This component of the wastewater discharge consists of spent etching acid, acidic rinse water, spent alkaline cleaning solution, and rocker coolant. These wastewaters are treated in the onsite treatment facility prior to discharge. Acid waters are treated in a continuous process. Spent etching acid and acidic rinse waters are treated utilizing a lime and settle process, defined as the Best Available Technology (BAT) by the U. S. Environmental Protection Agency, in the Non-Ferrous Metals Development Document.

Spent alkaline cleaning solution and an animal fat-based, nitrosating, (nitrosamine forming), compound free, rocker coolant are treated by batch processes in the onsite treatment facility. There have been no changes in the coolant used, or in the chemicals used to break the emulsion since August of 1999, when the Department approved on-site treatment of the spent rocker coolant.

Prior to treatment, these wastewaters contain fluoride, nitrate, zirconium, titanium, sodium, and small amounts of copper, zinc, and ammonia. The primary pollutant remaining after treatment is calcium nitrate. This group of wastewaters combined account for approximately 12,000 gpd, or 5 percent of the total discharge.

3. Alkaline rinse water

Alkaline rinse water is discharged without treatment and contains small amounts of soap solution. Alkaline rinse wastewater accounts for approximately 39,000 gpd, or 15 percent of the total discharge from the facility.

All wastewater streams are combined before discharge to the Columbia River.

Discharge Outfall

The approved reconstructed outfall was completed in July 2001. The outfall extends approximately 450 feet into the river. It is capped with a 33 foot long, 3 port diffuser, situated perpendicular to the river flow. The diffuser depth is approximately 23 feet at normal river flow conditions.

PERMIT STATUS

The previous permit for this facility was issued on July 10, 1998. The previous permit placed effluent limitations on the following parameters: flow, temperature, pH, suspended solids, oil and grease, fluoride, cyanide, ammonia, lead, nickel, chromium, copper, zinc, acute toxicity, and chronic toxicity.

A permit modification became effective on February 1, 2002, which established final limits for ammonia, temperature and pH based on the newly constructed outfall and authorization of mixing zones. Some submittal data requirements were revised as well.

An application for permit renewal was received and accepted by the Department on November 20, 2002.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

A compliance inspection without sampling was conducted on December 19, 2002. The facility appeared to be operated in a clean and orderly manner.

The Permittee has complied with all effluent parameter limitations except Total Suspended Solids, (TSS), based on Discharge Monitoring Reports (DMRs) submitted to the Department. The limits for TSS under the previous permit were an Average Monthly value of 11.89 lbs/day and a Maximum Daily value of 25.02 lbs/day. Average Monthly limits were exceeded 46% of the time in the last two years and Maximum Daily limits were exceeded 21% of the time during the same period. TSS is discussed further beginning on page 16 of this document

WASTEWATER CHARACTERIZATION

The permit application submitted by the Permittee contained wastewater characterization data, which has been combined with discharge monitoring data collected from November 2000 through November 2002. These data are presented in the table below.

Wastewater Characterization

Parameter	Maximum Daily Value		Maximum 30 Day Value		Long Term Average ¹	
	mg/L	lbs/Day	mg/L	Lbs/Day	mg/L	Lbs/Day
Total Suspended Solids ¹	21.6	45.9	16.5	27.93	6.09	12.34
Ammonia ¹	4.5	8.02	2.6	3.74	1.19	2.4
Hardness ¹	NA	NA	1150	1900	481.4	975.6
Fluoride ¹	1.3	2.49	1.0	1.55	0.41	0.82
Oil and Grease ²	1.8	3.4	NA	NA	NA	NA
Chromium ¹	.0038	.008	.0027	.001	.0027	.0003
Copper, Total ¹	.075	0.148	0.057	0.077	0.005	0.01
Lead, Total ¹	0.0005	0.001	0.00064	0.001	0.0001	0.0001
Nickel, Total ¹	0.0056	0.013	0.0082	0.011	0.002	0.004
Zinc, Total ¹	0.021	0.024	0.021	0.021	0.006	0.012
Cyanide, Total ¹	0.014	0.022	0.008	0.009	0.0002	0.0004
COD ²	22	31.2	NA	NA	NA	NA
BOD ²	6.0	8.5	NA	NA	NA	NA
Total Organic Carbon ¹	5.4	7.7	NA	NA	NA	NA
Nitrate-Nitrite ² (as N)	380	480	NA	NA	140.2	220
Total Phosphorus ² (as P)	.24	.34	NA	NA	NA	NA
Sulfate (as SO ₄) ²	290	411	NA	NA	NA	NA
Aluminum, Total ²	1.6	2.3	NA	NA	NA	NA
Iron, Total ²	0.130	0.18	NA	NA	NA	NA
Magnesium, Total ²	9.0	12.8	NA	NA	NA	NA
Arsenic, Total ²	0.0076	0.011	NA	NA	NA	NA
Surfactants ²	0.41	0.58	NA	NA	NA	NA
Barium ²	0.038	0.054	NA	NA	NA	NA
Molybdenum ²	0.011	0.016	NA	NA	NA	NA
Manganese ²	0.009	0.013	NA	NA	NA	NA
Titanium ²	0.130	0.18	NA	NA	NA	NA

Parameter	Maximum Daily Value		Maximum 30 Day Value		Long Term Average ¹	
	mg/L	lbs/Day	mg/L	Lbs/Day	mg/L	Lbs/Day
Antimony ²	0.0076	0.011	NA	NA	NA	NA
Phenols ²	0.170	0.24	NA	NA	NA	NA
Beryllium ²	ND	ND	‘	‘	‘	‘
Cadmium ²	ND	ND	‘	‘	‘	‘
Selenium ²	ND	ND	‘	‘	‘	‘
Silver ²	ND	ND	‘	‘	‘	‘
Thallium ²	ND	ND	‘	‘	‘	‘
Colbalt ²	ND	ND	‘	‘	‘	‘

ND-Not Detected NA-Not Applicable

¹-Based on data collected from the November 2000 through November 2002 DMRs.

²-means this parameter was characterized once, for use in the current permit application; results of all other parameters are based on historical monitoring data.

Volatile organic compounds, base-neutral, acid extractable and pesticides were not present at detectable levels.

Flow and temperature of the effluent are characterized as follows:

Characterization of Wastewater Flow and Temperature

Parameter	Maximum Daily Value	Maximum 30 Day Value	Long Term Average Value
Flow, gallons per day	301,400	247,147	176,167
Temperature °C	40.1	29.2	27.2

Characterization of Non-contact Cooling Water Pollutants

Parameter	Mean Concentration, µg/l	Pollutant Load in NCCW, lbs/day
Fluoride	380	0.63
Zinc	11.8	0.02
Copper	8.6	0.014

PROPOSED PERMIT LIMITS

Federal and State regulations require that effluent limitations set forth in an NPDES permit must be either technology- or water quality-based. Technology-based limitations are based upon the treatment methods available to treat specific pollutants. Technology-based limitations are set by regulation or developed on a case-by-case basis (40 CFR 125.3, and Chapter 173-220 WAC). Water quality-based limitations are based upon compliance with the Water Quality Standards for Surface Waters (Chapter 173-201A WAC), Water Quality Standards for Ground Waters (Chapter 173-200 WAC), Sediment Management Standards (Chapter 173-204 WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992). Each of these types of limits is described in more detail below, with the more stringent being chosen for each of the parameters of concern.

The limits in the proposed permit are based in part on information received in the permit application. The effluent constituents detailed in the application were evaluated on a technology- and water-quality basis, and the applicable limits necessary to meet the rules and regulations of the State were then determined and placed into the proposed permit. The Department does not need to develop effluent limits for all of the effluent pollutants reported in the proposed permit's application, because some pollutants don't have a reasonable potential to cause a water quality violation. If significant changes occur in any pollutant (constituent), as described in 40 CFR 122.42(a), the Permittee is required to notify the Department, as soon as possible.

POINTS OF COMPLIANCE

The previous permit designated two points of compliance at which water quality criteria must not be exceeded. This permit also designates two points of compliance. The rationale for having multiple points of compliance is to remove the influence of the non-contact cooling water portion from the mass loading effluent limits of the permit, thereby providing a more accurate profile of the process wastewater discharge. The effluent standards contained in the federal regulations that apply to the Permittee's discharge are meant to address process wastewater discharges.

Prior to the previous permit, monitoring to determine compliance was conducted after mixing with non-contact cooling water discharge. Pollutant concentrations in the process wastewater were mixed with non-contact cooling water, which makes up 80% of the combined discharge. At least some of the non-detects reported on DMRs submitted to the Department may have been caused by this dilution. Dilution of pollutants by non-process wastewater, as a means of meeting technology-based effluent limitations, is generally prohibited by federal and state regulations.

Furthermore, having the points of compliance include the non-contact cooling water discharge resulted in exceedances in some pollutant concentrations because of the nature of the facility's

water supply. For instance, the facility's water supply contains high concentrations of fluoride. The amount of fluoride contained in the non-contact cooling water portion of the discharge contributed to exceedances of the mass loading effluent limit for this parameter in the previous permit.

40 CFR 122.45(g)1(ii) allows the subtracting of pollutants in the water supply from that present in the discharge, if the water supply and receiving water is the same waterbody. The argument could be made that the aquifer and the Columbia River are in strong hydraulic continuity, because the well is only about 1,000 feet from the river and 400 ft deep. However, the permit writer felt that separating out the influence of the non-contact cooling water portion of the discharge is more in line with the spirit and the letter of the water quality regulations. Finally, the combined discharge, consisting of process wastewater and non-contact cooling water, was subjected to analysis for "reasonable potential" to exceed water quality criteria of the receiving water, thereby insuring that the discharge meets the state water quality standards.

Points of compliance for the effluent limits in this permit are as follows:

Parameter(s)	Point of Compliance
Metals	Pump pit
Fluoride	Pump pit
Cyanide	Pump pit
TSS	Pump pit
Ammonia	Over-the-dike pit
pH	Over-the-dike pit

The pump pit is at the confluence of all process wastewater streams, where compliance with technology-based categorical standards can be monitored. The over-the-dike pit is where process wastewater and non-contact cooling water is combined before discharge, a point at which compliance with the water quality-based standards can be effectively monitored.

TECHNOLOGY-BASED EFFLUENT LIMITS

Federal regulations require the use of Best Available Technology Economically Achievable (or BAT) criteria to calculate effluent limitations for this permit. Technology-based effluent limitations in Sandvik Special Metals' previous permit were based on BAT criteria contained in 40 CFR 471.62 for titanium forming and 40 CFR 471.92 for zirconium forming. The development document was referenced frequently throughout the permit writing process (*Development Document for Effluent Limitations Guidelines and Standards for the Nonferrous Metals Forming and Metal Powders Point Source Category, Vol. III*).

In order to determine whether each parameter is technology- or water quality-controlled, technology- and water quality-based effluent limits were calculated for each parameter, and the lowest limit was selected as the permit limitation. Methods used to calculate limits for each parameter are discussed in the following sections of this fact sheet.

Parameter	Criteria for Limits	
	Average Monthly	Daily Maximum
Ammonia	BAT ²	BAT
Chromium	BAT	BAT
Copper	BAT	BAT
Fluoride	BAT	BAT
Lead	BAT	BAT
Nickel	BAT	BAT
Zinc	BAT	BAT
Total Suspended Solids	BPT ³	BPT
pH	WQBEL ¹	

¹-WQBEL means water quality-based effluent limitation, which is protective of aquatic life in the Columbia River.

²-BAT means Best Available Technology Economically Achievable, a technology-based effluent limitation.

³-BPT means Best Practicable Control Technology Currently Available, a technology-based effluent limitation.

CALCULATION OF BAT AND BPT EFFLUENT LIMITATIONS

In accordance with the development document, the effluent limitations in this permit were presented and calculated as pounds of pollutant per off-pound of product metal. An off-pound is calculated from each pound of metal that passes through a step in the production process. For example, one pound of metal that is cold rolled twice in succession on the same or tandem rolling mill and then annealed represents one off-pound from the cold rolling process and one off-pound from the annealing process. However, if one pound of metal is cold rolled, annealed, and then cold rolled again, two off-pounds are assumed for the cold rolling process and one off-pound for annealing (*Development Document, Vol. III, p. 2202*).

Technology-based mass loading effluent limitations, expressed in pounds of each parameter discharged to the Columbia River, were calculated by adding the off-pounds of each pollutant allowed by each stage in the production process.

Technology-based limits were calculated by multiplying the number of off-pounds occurring in each step of the production process by an 'allowance,' or multiplier, for each pollutant parameter. Multipliers for each step of the production process are contained in 40 CFR 471.62 (titanium) and 40 CFR 471.92 (zirconium). There are different multipliers for daily maximum

and monthly average frequencies. The pounds of each pollutant generated at each step of the production process are totaled producing the final limit. Calculations of effluent limits for each parameter are shown in Appendix D. The calculations for copper are shown in the table below for example:

BAT EFFLUENT LIMITATIONS FOR COPPER ¹					
		Copper multiplier, per million Off-lbs.		Allowed Facility Discharge, in lbs./day	
Source	Daily Prod. in Off-lbs.	Maximum Daily	Monthly Average	Maximum Daily	Monthly Average
Zirconium Surface Treatment Bath	4,400	0.646	0.34	0.0028424	0.001496
Titanium Surface Treatment Bath	9100	0.395	0.208	0.0035945	0.0018928
Zirconium Etch Rinse	4400	1.69	0.888	0.007436	0.0039072
Titanium Etch Rinse	9100	5.55	2.92	0.050505	0.026572
Zirconium Alkaline Spent Bath	2500	3.04	1.6	0.0076	0.004
Titanium Alkaline Spent Bath	10800	0.456	0.24	0.0049248	0.002592
Zirconium Alkaline Rinse	2500	5.97	3.14	0.014925	0.00785
Titanium Alkaline Rinse	10800	0.525	0.276	0.00567	0.0029808
Zirconium Grind Cooling	700	0.61	0.321	0.000427	0.0002247
Zirconium Grind Rinse	700	0.342	0.18	0.0002394	0.000126
Zirconium Inspection	700	0.029	0.015	0.0000203	0.0000105
Titanium Grind	1350	0.905	0.476	0.00122175	0.0006426
Titanium Miscellaneous	1600	1600	0.062	0.032	0.0000992
		Total Copper Limitations		0.09950535	0.0523485

¹ Based on 2003-2008 production estimates provided by Sandvik Special Metals Corporation.

Columns in the table show, from left to right, each major production process, the number of off-pounds generated by each process, daily maximum and average monthly multipliers, and the resulting mass loading effluent limits. Calculations for each parameter are contained in Appendix D of this fact sheet.

Total Suspended Solids, (TSS)

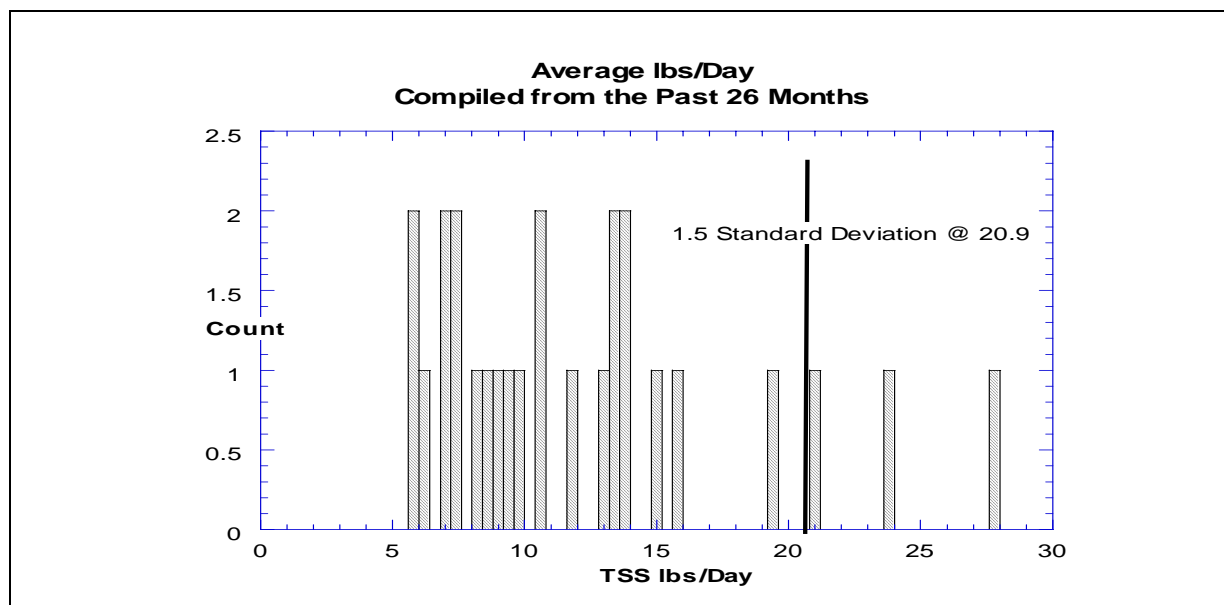
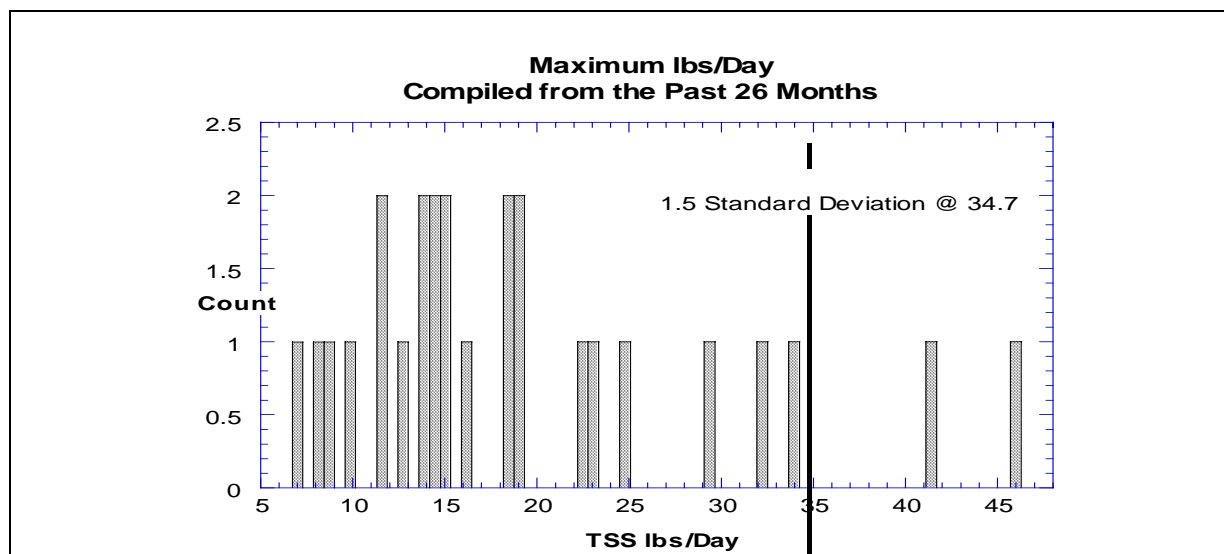
Although the state Surface Water Quality standards do not contain criteria regulating TSS, the Department is concerned that the Permittee's wastewater treatment facility does not comply with BPT performance standards. Federal regulations authorize states to impose effluent limitations more stringent than those required by federal law (40 CFR 122.1(f)). The effluent limits were developed from the Best Practicable Control Technology Currently Available (BPT) standards contained in 40 CFR 471.61 (titanium) and 471.91 (zirconium).

The Department recognizes that the categorical BPT based limits for TSS at the Sandvik Special Metals facility present a considerable challenge to that facility. The allowed TSS loading to the Columbia River has been reduced 250% since 1990. The 2003 BPT proposed production based limits are a Maximum Daily of 17.7 lbs/Day and an Average Monthly of 8.4 lbs/Day. In comparison, a small POTW's limits would typically deliver an allowed 200 lbs/Day on average and a maximum of 300 lbs/Day TSS to the receiving water.

The facility's water treatment process is precipitation with lime. The BPT limits are calculated on production, which is a linear projection. The performance of a lime precipitation clarifier to remove TSS is not. Although the facility's wastewater treatment can achieve the BAT metal limits easily, the lower BPT limit for TSS will require some form of augmentation to the clarifier.

It is believed that the bulk of the TSS is comprised of inorganic calcium carbonate. The Average Monthly and Maximum Daily limit concentrations of the virtually BOD free TSS discharge exiting the diffuser after mixing with non-contact cooling water are 4 mg/L and 8.5 mg/L respectively. Within the acute mixing zone the concentration would then be diluted to 0.1 mg/L and 0.24 mg/L, respectively, of TSS, if the Columbia was TSS free at that location. The ambient TSS load ranges from 2 to 7 mg/L as measured at Umatilla by the Department. The interim limits will maintain the concentration of TSS coming from Sandvik to below 1 mg/L in the acute mixing zone, which the Department believes will present little or no consequence to the receiving water.

The Interim Limits are based on the 95th percentile for Average Monthly limit and the 99th percentile for Daily Maximum limit of DMR values obtained over the last two years. These data were examined and those data points where the waste load exceeded 1.5 times the standard deviation were rejected from the percentile calculation as outliers. The following histograms illustrate this reasoning. The x-axis displays the lbs/Day mass loading any sampling event and the y-axis indicates the frequency of events with similar results.



With the outliers removed the 95th and 99th percentile are 15.75 lbs/Day for the Average Monthly limit and 33.47 lbs/Day for the Maximum Daily limit. The spreadsheet calculations are presented in appendix C.

It is in the Best Professional Judgment of this permit writer that these interim limits will have no ill effect on the water quality of the Columbia River based on the above reasons. The interim period will last approximately two years ending **March 15, 2005**. Conditions of the permit, S 6, consist of a series of milestones leading to the facility achieving effluent TSS mass loading

consistently below the BPT limits. These milestones are discussed in more detail on page 36 of this document.

EFFLUENT LIMITS: MASS LOADINGS VERSUS CONCENTRATIONS

Effluent limitations are required by EPA to be expressed as mass loadings; however, to facilitate comparison of effluent limitations to state water quality standards and monitoring results contained in laboratory reports, limits are also expressed as concentrations.

Effluent limitations which appear as concentrations, expressed in mg/l, were calculated for each parameter using the following formula:

$$(\text{Mass loading (lbs/day)} \div \text{Flow (MGD)} \div \text{Conversion factor 8.34 lbs/day, (density of water)})$$

Daily maximum effluent limitations, expressed as concentrations, were calculated using maximum daily mass loadings of each pollutant and the maximum daily flow of wastewater discharged to the river, as reported in the permit application. Average monthly effluent limitations, expressed as concentrations, were calculated using average monthly mass loadings of each pollutant and the average monthly flow of process wastewater discharged to the river, as reported in the permit application.

BAT AND BPT EFFLUENT LIMITS

Effluent limitations include both average monthly and daily maximum mass loading limits. The following effluent limits, presented in mass loadings for each parameter, were calculated using the methods described in the previous pages.

Technology-based Effluent Limitations

Parameter	Average Monthly (lbs/day)	Daily Maximum (lbs/day)
Ammonia	3.07	6.98
Chromium	0.0094	0.0233
Copper	0.0523	0.0995
Fluoride	1.3836	3.1182
Lead	0.01047	0.0220
Nickel	0.0645	0.0977
Zinc	0.0320	0.0765
Cyanide	0.0063	0.0143
Total Suspended Solids	8.4	17.7
Total Suspended Solids Interim Limits ¹	15.57	33.47

¹ Expire March 15, 2005

SURFACE WATER QUALITY-BASED EFFLUENT LIMITS

The State's Water Quality Standards for Surface Waters (Chapter 173-201A WAC) stipulate that waste discharge permits shall be conditioned such that the discharge will protect existing water quality and preserve the designated beneficial uses of the State's surface waters, WAC 173-201A-060. Surface water quality-based effluent limitations may be based either on an individual waste load allocation (WLA) or on a WLA developed during a basin-wide total maximum daily loading (TMDL) study.

Numerical Criteria for the Protection of Aquatic Life

"Numerical" water quality-based criteria are numerical values set forth in the State's Water Quality Standards for Surface Waters. They specify the maximum levels of pollutants allowed in receiving water while remaining protective of aquatic life. Numerical criteria are used along with the chemical and physical data of the wastewater and receiving water in order to derive the applicable effluent limits for the proposed permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, the water quality-based limitations must be used in the proposed permit.

Numerical Criteria for the Protection of Human Health

The EPA has promulgated 91 numerical water quality-based criteria for the protection of human health that are applicable to the State (EPA 1992). These criteria are designed to protect humans from cancer and other disease, and are primarily applicable to fish/shellfish consumption and drinking water from surface waters.

Narrative Criteria

In addition to numerical criteria, "narrative" water quality-based criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) surface waters in the State.

Antidegradation

The State's Antidegradation Policy requires that discharges to receiving water shall not further degrade the existing natural water quality of the water body. In cases where the natural conditions of receiving water are either of lower or higher quality than the criteria assigned, the natural conditions shall constitute the water quality-based criteria. More information concerning the State's Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

DESCRIPTION OF THE RECEIVING WATER

The facility discharges to the Columbia River at river mile 321 which is designated as a Class A receiving water in the vicinity of the outfall. This location is approximately 3 river miles below the confluence of the Snake and Columbia Rivers at 324.3 river miles. Other nearby point source outfalls, located upstream of Sandvik Special Metals, include the City of Kennewick Wastewater Treatment Plant, the City of Richland Wastewater Treatment Plant and the Agrium Fertilizer Plants. Significant non-point sources of pollutants include upstream runoff from agricultural and industrial activities. Characteristic uses of the receiving water include the following:

water supply (domestic, industrial, agricultural); stock watering; fish migration; fish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation. Water quality of this class shall meet or exceed the requirements for all or substantially all uses.

SURFACE WATER QUALITY CRITERIA

Applicable criteria are defined in the State's Water Quality Standards for Surface Water for aquatic biota. This segment of the Columbia River is on the 303(d) list of impaired water bodies for sediment bioassay. In addition, EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for this discharge are summarized below:

Fecal Coliforms	100 organisms/100 mL maximum geometric mean
Dissolved Oxygen	8 mg/L minimum
Temperature ¹	20° Celsius maximum or incremental increases above background
pH	6.5 to 8.5 standard units
Turbidity	less than 5 NTU above background
Toxics	No toxics in toxic amounts

¹ WAC 173-201A-130(21) establishes a special temperature criteria of 20° C for this segment of the Columbia River

Mixing Zones

The State's Water Quality Standards for Surface Waters allow the Department to authorize mixing zones around a point of discharge in order to establish surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants of concern that can have a toxic effect on the aquatic environment near their point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving "all known, available, and reasonable methods of prevention, control and treatment" (AKART) and that are in compliance with other mixing zone requirements of WAC 173-201A-100.

Sandvik Special Metals Corp. submitted to the Department a Conceptual Engineering Report for Plant Wastewater Discharge prepared by J-U-B Engineers of Kennewick, Washington on March 8, 2000. Approval of the Plans and Specifications was granted by the Department on October 31, 2000. The Department received notification that the diffuser construction was completed on September 5, 2001. Based on these improvements the Department issued a modification to the previous permit on January 3, 2002. These improvements allow the authorization of the acute mixing zone to extend no more than 30.5 ft downstream at a dilution of **36** and the chronic mixing zone to extend no more than 100 ft upstream and 305 ft downstream with a dilution factor of **470**. From this, establishment of final ammonia, temperature, and pH effluent limits were made.

Following a field study conducted on August 17, 1999 at Columbia River mile 321 by J-U-B Engineers, the diffuser criteria were established using a combination of the CORMIX Models 1& 2 for multi-port submerged diffusers. This modeling system is referenced in Department's *Guidance for Conducting Mixing Zone Analyses*, and its use for establishing chronic and acute mixing zones is supported by the Department.

The CORMIX Model was developed by the U.S. Environmental Protection Agency. It is an empirical model based on accumulated laboratory and field experience. The CORMIX Model requires input of multiple environmental parameters to predict the dilution factor at defined mixing zone boundaries. Among these parameters are: diffuser design, effluent characterization, river flow, depth and bottom morphology including the ambient river chemical and physical conditions. To assure that the dilution factors are computed with a margin of safety for human and aquatic life, river flow rates are based on historical record to determine low flows occurring at regular intervals for a specified duration. These flow conditions are:

- Average low flow for seven consecutive days with a recurrence of ten years, (7Q10), for aquatic life-based analysis.
- Average low flow for thirty consecutive days with a five year recurrence, (30Q5), for non-carcinogenic human health-based analysis.
- The calculated Harmonic mean flow for carcinogenic human health-based analysis.

At the site selected for the diffuser, the river is approximately 1.5 mile wide and the 7Q10 flow was 68,074 cfs. The 30Q5 flow was 73,886 cfs and the calculated Harmonic mean was 143,250 cfs. River flow is regulated downstream at the McNary Dam. The flows were calculated from data obtained between 1954 through 1996. Since the dam regulates flow and consequentially the depth of the river, the depth change as measured at the forebay of the dam is slight. It ranges from 335 ft to 340 ft above sea-level. Eighty percent of the time the depth is between 338 ft to 340 ft and 98% of the time the depth is above 336 ft. through the seasons. The worst case scenario, 7Q10 flow of 68,075 cfs, yielded an average velocity of 0.43 fps that was used for the diffuser design criteria.

Wastewater discharge volumes are required by the Department in the analysis of mixing zones. These requirements are given in the *Guidance for Conducting Mixing Zone Analyses*. For the analysis of the acute boundary the highest volume for the past three years during the season in which the critical flow or condition is likely to occur. This is typically in the fall and winter. A review of the data found the highest daily maximum flow to be 401,200 gpd on November 1998. Chronic boundary analysis is based on the highest monthly average flow during the critical period, which was 336,000 gpd on January 1998. Since the effluent to the diffuser has to be pumped at the “over the dike” pump pit the actual flow will range from 547,200 to 453,600 gpd depending on if one or two pumps are used. The design of the diffuser and the mixing zone analysis used these values.

Located approximately 450 ft off the bank and in 20 ft of water, the diffuser is 33 ft long with three risers spaced equally apart and each 1 ft riser has one 3 inch port facing away from the bank and perpendicular to the current. Although the two port configuration provides slightly better acute dilution due to higher port velocities, the three port configuration was selected because it provides better future growth potential. Using a combination of CORMIX Models 1&2 for the three port diffuser the average acute and chronic predicted dilutions factors were calculated to be 36 for the acute and 470 for the chronic. If desired, the diffuser efficiency can be increase 30% by replacing the 3 inch ports with 2 inch. However, there is additional risk of plugging with this configuration.

Temperature

The previous permit contained interim limits for average monthly and maximum daily effluent temperature. These limits were water quality-based because the Federal regulations do not establish technology-based temperature limits. Interim limits for temperature were established because of the lack of an authorized mixing zone. Upon completion of the facility’s diffuser installation, mixing zones have been established and the temperature limit reconsidered.

WAC 173-201A-130(21) establishes a special temperature criteria of 20.0°C for this segment of the Columbia River and details 2 tests to demonstrate compliance. The regulation states: When natural conditions exceed 20.0°C, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3°C; nor shall such temperature increases, at any time, exceed $t = 34/(T+9)$. The point of compliance for temperature is at the edge of the chronic mixing zone.

1. No temperature increase . . . greater than 0.3 °C

Utilizing a simple mass balance calculation, and assuming a chronic dilution factor of 470, an effluent temperature of 27.8°C, and an ambient temperature

of 21.6°C, the calculated temperature at the edge of the mixing zone is 21.61°C. The net temperature rise is 0.01°C, significantly less than the allowable 0.3°C. The effluent and ambient temperatures were taken from pages 14 and 33 of the engineering report, respectively, and reflect the 95th percentile values of each data set.

2. Temperature increase shall not exceed $t = 34/(T+9)$

$$t = 34/(21.6 + 9)$$

$$t = 1.1^{\circ}\text{C}$$

$$0.01^{\circ}\text{C} < 1.1^{\circ}\text{C}$$

Therefore, the temperature effluent limit has been dropped from the permit.

River Temperature Data	
Statistical Parameter	Temperature ° C
Mean	11.5
Standard Deviation	6.1
Minimum	0.8
Maximum	21.5
95 th Percentile	21.6
90 th Percentile	19.3

pH

River pH data were obtained from the WDOE monitoring station at Umatilla. The 10th and 90th percentile values are used in the dilution factor calculations. The effluent low pH value was based on the 5th percentile of pH 7.4 and the high value of pH 9 at the 95th percentile calculated with an Excel spreadsheet function.

River pH Data	
Statistical Parameter	pH
Mean	8.0
Minimum	7.1
Maximum	8.7
10 th Percentile	7.7
90 th Percentile	8.5

Ammonia

River ammonia data were obtained from the WDOE monitoring station at Umatilla.

River Ammonia Data

Statistical Parameter	Ammonia mg/l
Mean	0.014
Standard Deviation	0.0073
Minimum	Non-detect
Maximum	0.043
10 th Percentile	0.005
90 th Percentile	0.023

The aquatic life criterion for ammonia varies with the effects of temperature and pH and therefore a different dilution factor other than 36 and 470 must be calculated.

The following table contains the data entered into the equation to determine the relevant dilution factors.

Calculation of the relevant dilution factor was via the following equation:

$$DF = \frac{(C_e - C_a)}{(C_p - C_a)}$$

Where:

DF = dilution factor

C_e = concentration in discharge effluent

C_a = concentration in ambient receiving water

C_p = desired concentration at edge of mixing zone

Minimum Dilution Factor Calculations				
Critical Condition	Effluent Concentration, C _e	River Concentration, C _a	Permit Limit, C _p	Dilution Factor, DF
pH - low river pH and low effluent pH	5 th percentile value = 7.4	10 th percentile value = 7.7	Lower WQ based permit limit = 6.5	None required
pH - high river pH and high effluent pH	95 th percentile value = 9.0	90 th percentile value = 8.5*	Upper WQ based permit limit = 8.5	Infinite
pH - high river pH and high effluent pH	95 th percentile value = 9.0	90 th percentile value = 8.49	Upper WQ based permit limit = 8.5	30.4
Temperature – high river temp and high effluent temp	95 th percentile value = 27.8 °C	90 th percentile value = 19.3 °C	Upper WQ based permit limit = 20 °C	12.8
Ammonia – high river ammonia and high effluent ammonia	95 th percentile value = 2.681mg/l	90 th percentile value = 0.023mg/l	Upper WQ based permit limit = 0.146 mg/l	21.6
* The statistically calculated C _a for river pH is 8.5. However, this would require infinite DF. Therefore,				

Minimum Dilution Factor Calculations				
Critical Condition	Effluent Concentration, Ce	River Concentration, Ca	Permit Limit, Cp	Dilution Factor, DF
a Ca of 8.49 was used for the design, which should still be representative of river pH but will allow a reasonable design through the model.				

CONSIDERATION OF SURFACE WATER QUALITY-BASED LIMITS FOR NUMERICAL CRITERIA

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants -- their adverse effects diminish rapidly with mixing in receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs at some distance away from the discharge, even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which a pollutant of concern has its maximum effect.

The derivation of water quality-based limits takes into account the variability of the pollutant concentrations in the effluent and in the case of metals the ambient hardness of the receiving water. The ambient hardness of the Columbia River at the closest location to the Sandvik facility is 56 mg/L CaCO₃ as reported by the Annual Hanford Environmental Report. It should be noted that the two years average hardness of Sandvik's effluent is over 450 mg/L, which further lowers the potential toxicity of the metal constituents.

Comparison of Water Quality Based Limitations to BAT Limits ¹				
Parameter	WQBL ¹ lbs/Day		BAT lbs/Day	
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily
Lead	1.1	2.2	.013	.027
Copper	0.17	0.34	.063	0.12
Chromium	6.1	12.3	.011	.028
Nickel	15.6	31.3	.079	0.12
Zinc	1.2	2.5	.032	.077

¹ Calculation of WQBL Limitations is located at the end of Appendix C

Whole Effluent Toxicity

The State's Water Quality Standards for Surface Waters require that the applicant's discharge not cause toxicity in the receiving water. Many toxic pollutants cannot be directly measured by commonly available detection methods, due to their extremely low concentrations.

Acute WET tests measure mortality as the observed response to toxicity in a facility's final effluent. Dischargers who monitor their wastewater with acute toxicity tests are providing an indication of the potential lethal effect of their discharges to living organisms resident in the receiving water environment.

Chronic WET tests usually involve a critical stage of the test organism's life cycle, or the entire life cycle, measure various observable sublethal toxic responses such as retarded growth or reduced reproduction. Organism survival may also be measured in chronic WET tests.

In accordance with WAC 173-205-060, the Permittee must continue effluent testing due to the newly completed (July 2001) outfall and diffuser and testing problems. Prior to WET however, the Department is requiring Sandvik Specialty Metals to conduct an ammonia toxicity series test in accordance with Section 3 of the EPA Methods for Aquatic Toxicity Identification Evaluations publication EPA/600/3-88/035. The Department believes an Aquatic Toxicity Identification Evaluation for ammonia has the potential to produce meaningful reductions of effluent toxicity rapidly through targeted testing rather than whole effluent testing at this juncture in time. This testing shall occur in the fall of 2005 following the institution of the BPT total suspended solids limitations with all subsequent reports received no more than 60 days following the initial sampling event.

Six months following completion of the Ammonia Toxicity Evaluation, the Department will require the Permittee to submit a report which will:

- Address the technological and/or BMPs through which ammonia toxicity may be reduced.
- Outline achievements already made and develop an implementation schedule for ammonia toxicity reduction.

The Department will require Acute and Chronic Wet Testing to be conducted in the fall and summer of the year following the next permit cycle with all subsequent reports received no more than 60 days following the initial sampling event

Wet Test Review

Wet test sampling occurred on May 1, 2000. Although some problems occurred while testing was conducted at the laboratory, the results of the wet testing were evaluated by the Department on June 27, 2002. The evaluations determined that the **ACEC of 2.8%** was not toxic, and the **NOEC was 10%**.

Acute and chronic WET testing for effluent characterization was conducted during the previous permit term. The Acute Critical Effluent Concentration, ACEC, is the inverse of the acute dilution factor. The **ACEC** for the Permittee's discharge is **2.8%**. The CCEC is the inverse of

the chronic dilution zone. The **CCEC** is **0.2 %**. The No Observed Effects Concentration, NOEC, is the highest concentration of whole effluent where no effects on the test organism were observed

Sediment Quality

The Department has promulgated Sediment Management Standards (Chapter 173-204 WAC) to protect aquatic biota and human health. Those standards stipulate that the Department may require dischargers to evaluate the potential for their wastewater to cause a violation of the Sediment Management Standards.

The Department has determined through a review of the submitted final effluent characteristics that the applicant's discharge has no reasonable potential to violate the Sediment Management Standards. In addition, TSS will be further characterized as part of S.C. 6B of the permit.

GROUND WATER QUALITY LIMITS

The Department has promulgated the State's Water Quality Standards for Ground Waters (Chapter 173-200 WAC) to protect beneficial uses of ground water. Permits issued by the Department shall be conditioned in such a manner so as not to allow violations of those water quality standards (WAC 173-200-100).

The applicant has no discharge to ground and, therefore, no limitations are required.

COMPARISON OF EFFLUENT LIMITS WITH THE PREVIOUS PERMIT

The previous permit was issued on July 10, 1998 and later modified, effective on February 1, 2002. The Addendum to the Permit contained final effluent limits which are given in the following table as 'existing' limits. The following 'proposed' limits are those which the Department has determined to be appropriate for inclusion into this permit. The statutory effluent limitations are mass loadings, measured in pounds per day (lbs/day). Concentrations are provided as a reference and for convenience sake, because most people are more familiar with the quantization of pollution in this format. Concentrations were calculated assuming flows of 0.05 MGD at the sump pit or 0.251 MGD at the over the dike pit.

Comparison of the Existing Limits to the Proposed Effluent Limits

Parameter (Basis of New Limit) ²	Existing Limits		Proposed Limits	
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Process Wastewater 0.0500 MGD ¹				
Fluoride (BAT)	2.06 * lbs/Day	4.65 lbs/Day	1.38 lbs/Day 3.3 mg/L ²	3.12 lbs/Day 7.48 mg/L
Cyanide (BAT)	0.009	0.022	0.006 “ 0.014	0.014 “ 0.034
Lead (BAT)	0.016	0.033	0.010 “ 0.025	0.022 “ 0.053
Nickel (BAT)	0.097	0.147	0.065 “ 0.025	0.098 “ 0.234
Chromium (BAT)	0.014	0.035	0.009 “ 0.023	0.023 “ 0.056
Copper (BAT)	0.077	0.148	0.052 “ 0.126	0.10 “ 0.239
Zinc (BAT)	0.047	0.114	0.032 “ 0.077	0.077 “ 0.184
Total Suspended Solids ³ (BPT)	11.89	25.02	5.18 (23.3) ³ 12.4 (55.9)	17.7 (44.9) ⁴ 42.5 (107.7)
Combined process wastewater and non-contact cooling water approximately 0.251 MGD				
Ammonia	4.57	10.39	3.07 1.47	6.98 3.33
pH	Between 7-10 at all times		Between 7-10 at all times	

¹ MGD means million gallons per day

² Concentration values are presented for comparison with mass limits only and do not represent limits.

³ -Effluent limitations based on: 1) BAT-Best Available Technology; 2) BPT-Best Practicable Technology.

* Concentration levels are provided for the next permit period only.

⁴ Numbers in bold are interim limits based on the 95th and 99th percentile.

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

The monitoring schedule is detailed in the proposed permit under Condition S2. Specified monitoring frequencies take into account the quantity and variability of the applicant's discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

Monitoring Schedule

Parameter	Sample Frequency	Sample Type	Sample Point
Process Wastewater			
Lead	Once per month	24 hour composite	Pump pit
Nickel	Once per month	24 hour composite	Pump pit
Chromium	Once per month	24 hour composite	Pump pit
Copper	Once per month	24 hour composite	Pump pit
Zinc	Twice per month	24 hour composite	Pump pit
Fluoride	Twice per month	24 hour composite	Pump pit
Cyanide	Twice per year	24 hour composite	Pump pit
Total Suspended Solids	Once a week	24 hour composite	Pump pit
Combined Discharge			
Flow	Daily	Metered	Over-the-dike pit
Ammonia	Weekly	24 hour composite	Over-the-dike pit
Nitrate-Nitrogen	Monthly	24 hour composite	Over-the-dike pit
Hardness	Monthly	24 hour composite	Over-the-dike pit
pH	Daily	Continuous record	Over-the-dike pit
Temperature	Daily	Continuous record	Over-the-dike pit

Metals

On the basis of the Permittee's past record of compliance for metals in accordance with the *Permit Writer's Manual, Chapter XIII, pg. 15. Table XIII-1A1*, this permit will reduce the monitoring frequency for the following metals to once per month. The Permit Writer's Manual guidelines could allow for a reduction of the monitoring frequency to quarterly based upon the facilities past performance, however it is this permit writer's opinion that monthly monitoring is a more prudent approach given the industrial category of the Permittee. Performance is defined as the ratio of the most recent 2 year monthly average to the limit for a given parameter. In the event exceedances of effluent limits occur, or production processes change, the Department reserves the right to adjust the monitoring frequency to fit the circumstances.

Parameter	Sandvik's 2 year Average		Proposed Limits		Daily Maximum Performance as Percent of Proposed Limit
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	
Lead	0.0001 lbs/day	0.001 lbs/day	0.013 lbs/day	0.027 lbs/day	3.7
Nickel	0.004 lbs/day	0.007 lbs/day	0.079 lbs/day	0.12 lbs/day	5.8
Chromium	0.0003 lbs/day	0.001 lbs/day	0.011 lbs/day	0.028 lbs/day	3.6
Copper	0.010 lbs/day	0.016 lbs/day	0.063 lbs/day	0.12 lbs/day	13.3
Zinc	0.012 lbs/day	0.016 lbs/day	0.03 lbs/day	0.08 lbs/day	15.0

Zinc

Monitoring for Zinc shall be maintained at the previous permit level of twice per month.

Parameter	Sandvik's 2 year Average		Proposed Limits	
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Zinc	0.012 lbs/day	0.016 lbs/day	0.032 lbs/day	0.077 lbs/day

Ammonia

Monitoring for Ammonia shall be maintained at the previous permit level, (weekly).

Parameter	Sandvik's 2 year Averages		Technology Based Limit	
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Ammonia	2.03 lbs/Day 0.97 mg/L	4.85 lbs/Day 1.46 mg/L	3.07 lbs/Day 1.47 mg/L	6.98 lbs/Day 2.1 mg/L

Nitrates

Nitrate is not listed in the federal categorical standards for this industry. For surface waters of the State the Department does have the authority to regulate this compound, and the discharge of this pollutant to the receiving water concerns the Department.

EXPIRATION DATE: JULY 31, 2008

The average monthly level of nitrate discharged for the last two years is 284 lbs/day. The average includes an event of 1637 lbs/day occurring in June 2001. If this event is eliminated from the average monthly calculation the average is reduced to 228 lbs/day. This loading is equivalent to approximately 3 mg/L within the acute mixing zone after mixing with the non-contact cooling water portion of the wastestream.

The Permittee and the Department surmise the high nitrate concentration results from the large amount of nitric acid used in the production process. This permit requires monitoring of nitrate because the Department anticipates that the Permittee will be modifying the production and wastewater treatment processes, and monitoring of nitrate levels in the discharge will provide an indication of the effectiveness of the modifications. In the best professional judgment of the Central Regional Office Water Quality Engineer, monitoring of nitrates on a monthly basis should be maintained.

Fluoride

Monitoring for Fluoride shall be maintained at the previous permit level, (monthly).

Parameter	Sandvik's 2 year Average		Proposed Limits	
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Fluoride	0.82lbs/day 2 mg/L	1.05 lbs/day 2.5 mg/L	1.38 lbs/day 3.3 mg/L	3.11 lbs/day 7.5 mg/L

Cyanide

This previous permit required the Permittee to monitor process wastewater discharges for cyanide on a twice-per-month basis. Cyanide had previously been detected once, when questionable laboratory protocols were used between February and November of 1995. The Method Detection Level of EPA Test Method No. 335.2 as reported by the lab is 5 µg/l. The last five years of monitoring did not find cyanide at detectable levels. Therefore the monitoring requirement for cyanide will be reduced to twice a year.

Parameter	Sandvik's 2 year Average		Proposed Limits		Performance
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Percent of Limit
Cyanide	ND ¹	ND	0.006 lbs/day 14 µg/L	0.014 lbs/day 34 µg/L	0

¹ Non-detect

Total Suspended Solids

Monitoring of TSS will continue on a weekly basis through the 2003-2008 permit term or until that time the Permittee can demonstrate a consistent record of compliance with the BPT limit for TSS.

Parameter	Sandvik's 2 year Average		Calculated BPT Limits		Interim Limits	
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average ¹	Daily Maximum ²
Total Suspended Solids	12.3 lbs/day 29.4 mg/L ³	19.4 lbs/day 46.5 mg/L	8.4 lbs/day 20.1 mg/L	17.7 lbs/day 42.4 mg/L	15.6 lbs/day 37.4 mg/L	33.5 lbs/day 80.3 mg/L

¹ Based on the 95th percentile of the past two years selected data, 2000-2002.

² Based on the 99th percentile of the past two years selected data, 2000-2002.

³ Assuming 0.05 MGD and before non-contact cooling water dilution factor of four.

pH

The technology-based pH limits are not less than 7.5 and not more than 10.0 Standard Units. Under the previous permit the Permittee requested pH effluent limits of not less than 7.0 and not more than 10.0. This request was for an extension into the mid-range of the State's Surface Water Quality criteria of between 6.5 and 8.5. WAC 173-201A-030(2)(c)(v) allows a human-caused variation of less than 0.5 at the edge of the chronic mixing zone.

The Department's standard spreadsheet was used to model pH impacts to the receiving water. The lower pH of the discharge was not modeled because it lies within the water quality criteria. However, a discharge pH of 10 was modeled to assess compliance with the water quality criteria of 9.0. The analysis predicts the discharge will raise the pH of the receiving water, at the edge of the chronic mixing zone, from 8.70 to 8.71, or a net increase of 0.01. (A copy of the spreadsheet is presented in Appendix C of this fact sheet.)

In the best professional judgment of the permit writer, that although the final pH limits of not less than 7.0 and not more than 10.0 is slightly less stringent than the technology-based limits (of 7.5 and 10), they are justified because: (1) the lower limit of 7.0 is within the range of the State's water quality criteria, and (2) the impact of the discharge to the receiving water at the edge of the mixing zone is within the range allowed by State Surface Water Quality Standards.

Hardness

The hardness of the combined discharge will be sampled monthly. Hardness of the discharge gives an indication of the bio-availability of the metal parameters and, consequently, their toxicity.

LAB ACCREDITATION

With the exception of certain parameters the proposed permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories*.

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The requirements of Condition S3. are based on the Department's authority to specify any appropriate reporting and recordkeeping requirements in order to prevent and control waste discharges to the waters of the State (WAC 273-220-210).

The Permittee is required to report laboratory results of wastewater sampling in terms of mass loading, in lbs/day. Temperature must be reported in °C.

SPILL PLAN

The Department has determined that the Permittee stores a quantity of chemicals that have the potential to cause water pollution if accidentally released. The Department has the authority to require the Permittee to develop best management plans to prevent accidental release under section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080.

The Permittee has developed a Spill Plan for preventing the accidental release of pollutants to State waters and for minimizing damages if such a spill occurs. A revised spill plan was received by the Department November 20, 2002. Special Condition S7 requires the Permittee to update this plan as needed and submit such updates to the Department. If it was not necessary to revise the plan, the Permittee must send written notification to the Department that the Spill Plan remains unchanged with the application for permit renewal.

SOLID WASTE PLAN

The Department has determined that the Permittee has a potential to cause pollution of the waters of the State from leachate of solid waste. The Permittee developed and submitted its plan to the Department, which received it April 28, 1995.

Special Condition S5. requires, under the authority of RCW 90.48.080, that the Permittee update its Solid Waste Plan which is required to prevent solid waste from causing pollution of the waters of the State. An update of the plan, or written notification that it was unnecessary to revise the plan, is required to be submitted to the Department with application for permit renewal. The plan must also be submitted to the local permitting agency, for approval, if required by Chapter 173-304 WAC.

COMPLIANCE SCHEDULE FOR TSS MITIGATION

Recent characterization data shows the Permittee's discharge is likely to exceed the federal technology-based standards for total suspended solids. This problem arises from lowered limits tied to decreased production rates.

This permit places the Permittee under a schedule to achieve the BPT standards for these parameters. A compliance schedule gives the Permittee time to study a specific problem, explore different methods of dealing with the problem, and implement a practical solution under CFR 122.45 (b)(ii)(A)(1).

This compliance schedule, in the judgment of the permit writer, allows the Permittee time to explore and experiment with solutions to reduce discharges of TSS, develop and carry out an implementation plan, and comply with BPT limits before the end of the permit cycle. This will be achieved through a series of milestones leading to compliance two years into the permit term. The milestones are as follows:

A. 1 Milestone 1, September 15, 2003: Immediate Remedies Report

Investigate and implement methods to reduce TSS loading through readily available technologies and process changes. The report shall list remedies investigated and quantify improvements to the system.

A. 2 Milestone 2, December 15, 2003: Pollutant Characterization Report

Characterize the chemical and physical properties of the TSS material. The report shall include results of analysis with discussion.

B. Milestone 3, March 15, 2004: Treatment Recommendation Engineering Report

The Permittee shall develop an engineering report that will outline technologies investigated with the rationale for the selection of the treatment candidate and expected TSS reduction performance. The report shall include any additional milestones in the implementation process leading to completion of the project by March 2005.

C. Milestone 4, March 15, 2005: Treatment Process Affidavit

Provide the Department an affidavit indicating the treatment process selected is on line and functioning to specification. Submit any drawings, O&M documentation and/or performance criteria indicating the Permittee is capable of operating in compliance with the BPT limits for TSS.

OPERATIONS AND MAINTENANCE MANUAL

In accordance with State and Federal regulations, the Permittee is required to take all reasonable steps to properly and adequately operate and maintain the treatment system as stipulated in 40 CFR 122.41(e) and WAC 173-220-150(1)(g). The Permittee has previously developed and submitted an O&M Manual for Department review. It has been determined that the implementation of the procedures in the O&M manual contains reasonable measures to ensure compliance with the terms and limitations in the proposed permit. The Permittee is required to review the manual at least annually, in accordance with Special Condition S4.A.

GENERAL CONDITIONS

General Conditions are based directly on State and Federal law and regulations and have been standardized for all individual industrial NPDES permits issued by the Department.

Condition G1. requires responsible officials or their designated representatives to sign submittals to the Department. Condition G2. requires the Permittee to allow the Department to access the treatment system, production facility, and records related to the proposed permit. Condition G3. specifies conditions for modifying, suspending or terminating the proposed permit. Condition G4. requires the Permittee to apply to the Department prior to increasing or varying the discharge from the levels stated in the proposed permit's application. Condition G5. requires the Permittee to construct, modify, and operate the permitted facility in accordance with approved engineering documents. Condition G6. prohibits the Permittee from using the proposed permit as a basis for violating any laws, statutes or regulations. Conditions G7. and G8. relate to renewal and transfer of the proposed permit. Condition G9. requires the Permittee to control its production in order to maintain compliance with its proposed permit. Condition G10. prohibits the reintroduction of removed substances back into the effluent. Condition G11. states that the Department will modify or revoke and reissue the proposed permit to conform to more stringent toxic effluent standards or prohibitions. Condition G12. incorporates by reference all other requirements of 40 CFR 122.41 and 122.42. Condition G13. notifies the Permittee that additional monitoring requirements may be established by the Department. Condition G14. requires the payment of permit fees. Condition G15. describes the penalties for violating conditions of the proposed permit.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

The Department may modify the proposed permit to impose numerical limitations, if necessary to meet the State's Water Quality Standards for Surface Waters, Sediment Management Standards, or Water Quality Standards for Ground Waters, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify the proposed permit as a result of new or amended State or Federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

The proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, protect human health, aquatic life, and the beneficial uses of waters of the State. The Department proposes that the proposed permit be issued for five (5) years.

REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.
1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.
1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. EPA Office of Water, Washington, D.C.
1986. Development Document for Effluent Limitations Guidelines and Standards for the Nonferrous Metals Forming and Metal Powders Point Source Category. EPA/440/1-86/019.
1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.
1983. Water Quality Standards Handbook. EPA Office of Water, Washington, D.C. Tsivoglou, E.C., and J.R. Wallace.
1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Washington State Department of Ecology.

1994. Permit Writer's Manual. Publication Number 92-109

Wright, R.M., and A.J. McDonnell.

1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(E2). (Cited in EPA 1985 op.cit.)

APPENDIX A -- PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The proposed permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on July 24, 2002 in the Tri-City Herald to inform the public that an application had been submitted and to invite comment on the reissuance of the proposed permit.

The Department published a Public Notice of Draft (PNOD) on May 29, 2003 in the Tri-City Herald to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator
Washington State Department of Ecology
Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, WA 98902

Any interested party may comment on the draft permit or request a public hearing on the draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in the draft permit will be mailed an individual notice of hearing (WAC 173-220-100).

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the proposed permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in the proposed permit.

Further information may be obtained from the Department by telephone, 509/457-7105, or by writing to the address listed above.

The proposed permit and fact sheet were written by Richard Marcley.

APPENDIX B -- GLOSSARY

Acute Toxicity -- The lethal effect of a compound on a living organism that occurs within a short period of time, usually within 48 to 96 hours.

AKART -- An acronym used in State regulations which means "all known, available, and reasonable methods of prevention, control, and treatment".

Ambient Water Quality -- The existing environmental condition of the water in a receiving waterbody.

Ammonia -- Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also may increase the amount of chlorine needed to disinfect wastewater.

Best Management Practices (BMPs) -- Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD₅ -- Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent through the rate of utilization of oxygen by bacteria. The BOD₅ is used in modeling to measure the reduction of dissolved oxygen (DO) in a receiving water after effluent is discharged. Stress caused by reduced DO levels makes organisms less competitive and less able to sustain their species in the immediate aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass -- The intentional diversion of waste streams from any portion of a treatment facility.

Chlorine -- Chlorine is used to disinfect wastewater of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity -- The effect of a compound on a living organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters for determining the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA) -- The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance Inspection -Without Sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its wastewater discharge permit or with applicable statutes and regulations.

Compliance Inspection -With Sampling -- A site visit to accomplish, at a minimum, the purpose of a Compliance Inspection - Without Sampling along with the addition of sampling and analysis for all parameters limited by a wastewater discharge permit in order to ascertain compliance with those limits, including all applicable percent removal requirements. Additional sampling may be conducted during the compliance inspection.

Composite Sample -- A mixture of individual grab samples collected at the same sampling point at different moments during a distinct period of time, typically 24-hours. The sample can be collected either by continuous sampling or by mixing discrete samples, and may be a "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction Activity -- Clearing, grading, excavation or any other activity which disturbs the surface of the land. Such other activities include: road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Critical Condition -- The time of the year when the flow within the receiving water is low, typically at when 7Q10 would occur. At such time the ability of the receiving water to dilute effluent is significantly reduced and, therefore, waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. Other parameters are typically chosen at their 90th percentile during the same time of year as the 7Q10, or at their 95th percentile when collected year-round.

Daily Maximum Discharge Limitation -- The highest allowable Daily Discharge Value which the Permittee may discharge to the receiving water, without violating the issued NPDES permit.

Daily Discharge Value -- The average of the discharge measurements for an effluent pollutant parameter obtained over a single calendar day, or any 24-hour period that reasonably represents the calendar day for purposes of sampling. It is calculated as the sum of all discharge values measured during a calendar day, divided by the number of discharge values measured during that same calendar day.

Dilution Factor -- A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report -- A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater treatment facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria -- Fecal coliform bacteria are used as indicator organisms of pathogenic bacteria in the effluent which are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfection with chemicals such as chlorine or ozone. In a water body, the presence of high numbers of fecal coliform bacteria can indicate the recent release of untreated wastewater, a break-down of disinfection processes, and/or the presence of warm-blooded animal feces.

Grab Sample -- A single sample or measurement taken at a specific time or over as short a period of time as is feasible.

Industrial Wastewater -- Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Major Facility -- A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Method Detection Level (MDL) -- The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero, and is determined from analysis of a sample in a given matrix containing the analyte.

Minor Facility -- A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone -- An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in State regulations (Chapter 173-201A WAC).

Monthly Average Discharge Limitation -- The highest allowable Monthly Average Discharge Value which the Permittee may discharge into the receiving water, without violating the issued NPDES permit.

Monthly Average Discharge Value -- The average of the Daily Discharge Values for an effluent pollutant parameter obtained during a calendar month. It is calculated as the sum of all Daily Discharge Values measured during a calendar month, divided by the number of Daily Discharge Values measured during that same calendar month.

National Pollutant Discharge Elimination System (NPDES) -- The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. The State is one of many which have been delegated by EPA the authority to issue wastewater discharge permits. NPDES permits issued by State permit writers are joint NPDES/State permits issued under both State and Federal laws.

pH -- The pH of a liquid is a measure of its acidity or alkalinity. A pH of 7.0 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Quantitation Level (QL) -- A calculated value typically equal to five times the MDL (method detection level).

State Waters -- Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the State. Synonymous with "waters of the State".

Storm water -- That portion of precipitation which does not naturally percolate into the ground or evaporate, but rather flows via overland passage, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based Effluent Limit -- A permit limit on the concentration or mass of an effluent pollutant parameter which is based on the ability of a treatment method, or a set of treatment methods, to reduce the specific pollutant from the influent waste stream and thereby preventing its discharge into the receiving water.

Total Suspended Solids (TSS) -- Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset -- An exceptional incident in which there is unintentional and temporary noncompliance with permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit -- A permit limit on the concentration or mass of an effluent pollutant parameter that is intended to prevent that parameter from exceeding its water quality-based criterion after it is discharged into a receiving water.

APPENDIX C -- TECHNICAL CALCULATIONS

CALCULATION OF WATER QUALITY-BASED EFFLUENT LIMITS

Water quality-based effluent limits are calculated by the two-value wasteload allocation process as described on page 100 of the Technical Support Document (EPA, 1991) and shown below.

1. Calculate the acute wasteload allocation (WLA_a) by multiplying the acute criteria by the acute dilution factor and subtracting the background factor. Calculate the chronic wasteload allocation (WLA_c) by multiplying the chronic criteria by the chronic dilution factor and subtracting the background factor.

$$WLA_a = (\text{acute criteria} \times \text{acute zone dilution factor}) - (\text{background concentration} \times (\text{acute zone dilution factor} - 1))$$

$$WLA_c = (\text{chronic criteria} \times \text{chronic zone dilution factor}) - (\text{background concentration} \times (\text{chronic zone dilution factor} - 1))$$

2. Calculate the long term averages (LTA_a and LTA_c) which will comply with the wasteload allocations WLA_a and WLA_c , as follows:

$$LTA_a = WLA_a \sigma e^{[0.5\sigma^2 - z\sigma]}$$

$$LTA_c = WLA_c \sigma e^{[0.5\sigma^2 - z\sigma]}$$

where:

$$\sigma^2 = \ln[CV^2 + 1]$$

$$z = 2.326$$

$$CV = \text{coefficient of variation}$$

where:

$$\sigma^2 = \ln[(CV^2 \div 4) + 1]$$

$$z = 2.326$$

$$CV = \text{coefficient of variation}$$

3. Use the smallest LTA of the LTA_a or LTA_c to calculate the maximum daily limit (MDL) and the average monthly limit (AML), as follows:

$$MDL = LTA \times e^{[z\sigma - 0.5\sigma^2]}$$

$$AML = LTA \times e^{[z\sigma_n - 0.5\sigma_n^2]}$$

where:

$$\sigma^2 = \ln[CV^2 + 1]$$

$$z = 2.326 \text{ (99th percentile)}$$

$$LTA = \text{Limiting long term average}$$

where:

$$\sigma_n^2 = \ln[(CV^2 \div n) + 1]$$

$$z = 1.645 \text{ (95th percentile)}$$

$$n = \text{numbers of samples/month}$$

$$LTA = \text{Limiting long term average}$$

Calculation of pH of a mixture of two flows. Based on the procedure in EPA's DESCON program (EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington D.C.)

Based on Lotus File PHMIX2.WK1 Revised 19-Oct-93

INPUT

1. DILUTION FACTOR AT MIXING ZONE BOUNDARY	470.000
1. UPSTREAM/BACKGROUND CHARACTERISTICS	
Temperature (deg C):	21.60
pH:	8.70
Alkalinity (mg CaCO3/L):	50.00
2. EFFLUENT CHARACTERISTICS	
Temperature (deg C):	27.80
pH:	10.00
Alkalinity (mg CaCO3/L):	500.00

OUTPUT

1. IONIZATION CONSTANTS	
Upstream/Background pKa:	6.37
Effluent pKa:	6.33
2. IONIZATION FRACTIONS	
Upstream/Background Ionization Fraction:	1.00
Effluent Ionization Fraction:	1.00
3. TOTAL INORGANIC CARBON	
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	50.23
Effluent Total Inorganic Carbon (mg CaCO3/L):	500.11
4. CONDITIONS AT MIXING ZONE BOUNDARY	
Temperature (deg C):	21.61
Alkalinity (mg CaCO3/L):	50.96
Total Inorganic Carbon (mg CaCO3/L):	51.19
pKa:	6.37
pH at Mixing Zone Boundary:	8.71

Calculations of Technology-based Effluent Limitations

BAT EFFLUENT LIMITATIONS FOR CHROMIUM

Source	Daily Prod. in Off-lbs.	Chromium Allotment per million Off-lbs.		Allowed SSM Discharge in lbs./day	
		Maximum Daily	Monthly Average	Maximum Daily	Monthly Average
Zirconium Surface Treatment Bath	4,400	0.15	0.061	0.00066	0.0002684
Titanium Surface Treatment Bath	9,100	0.092	0.038	0.0008372	0.0003458
Zirconium Etch Rinse	4,400	0.39	0.16	0.001716	0.000704
Titanium Etch Rinse	9,100	1.29	0.526	0.011739	0.0047866
Zirconium Alkaline Spent Bath	2,500	0.704	0.288	0.00176	0.00072
Titanium Alkaline Spent Bath	10,800	0.106	0.043	0.0011448	0.0004644
Zirconium Alkaline Rinse	2,500	1.38	0.565	0.00345	0.0014125
Titanium Alkaline Rinse	10,800	0.122	0.05	0.0013176	0.00054
Zirconium Grind Cooling	700	0.141	0.058	0.0000987	0.0000406
Zirconium Grind Rinse	700	0.079	0.032	0.0000553	0.0000224
Zirconium Inspection	700	0.007	0.003	0.0000049	0.0000021
Titanium Grind	1350	0.21	0.086	0.0002835	0.0001161
Titanium Miscellaneous	1600	0.14	0.006	0.000224	0.0000096
Total Chromium Limitations				0.023291	0.0094325

BAT EFFLUENT LIMITATIONS FOR CYANIDE

Source	Daily Prod. in Off-lbs.	Cyanide Allotment per million Off-lbs.		Allowed SSM Discharge in lbs./day	
		Maximum Daily	Monthly Average	Maximum Daily	Monthly Average
Zirconium Surface Treatment Bath	4,400	0.099	0.041	0.0004356	0.0001804
Titanium Surface Treatment Bath	9,100	0.06	0.025	0.000546	0.0002275
Zirconium Etch Rinse	4,400	0.258	0.107	0.000264	0.0004708
Titanium Etch Rinse	9,100	0.847	0.351	0.0077077	0.0031941
Zirconium Alkaline Spent Bath	2,500	0.464	0.192	0.00116	0.00048
Titanium Alkaline Spent Bath	10,800	0.07	0.029	0.000756	0.0003132
Zirconium Alkaline Rinse	2,500	0.911	0.377	0.0022775	0.0009425
Titanium Alkaline Rinse	10,800	0.08	0.033	0.000864	0.0003564
Zirconium Grind Cooling	700	0.093	0.039	0.0000651	0.0000273
Zirconium Grind Rinse	700	0.052	0.022	0.0000364	0.0000154
Zirconium Inspection	700	0.004	0.002	0.0000028	0.0000014
Titanium Grind	1350	0.138	0.057	0.0001863	0.00007695
Titanium Miscellaneous	1600	0.009	0.004	0.0000144	0.0000064
Total Cyanide Limitations				0.0143158	0.00629235

BAT EFFLUENT LIMITATIONS FOR FLOURIDE

Source	Daily Prod. in Off-lbs.	Fluoride Allotment per million Off-lbs.		Allowed SSM Discharge in lbs./day	
		Maximum Daily	Monthly Average	Maximum Daily	Monthly Average
Zirconium Surface Treatment Bath	4,400	20.3	8.98	0.08932	0.039512
Titanium Surface Treatment Bath	9,100	12.4	5.49	0.11284	0.049959
Zirconium Etch Rinse	4,400	52.9	23.5	0.23276	0.1034
Titanium Etch Rinse	9,100	174	77.1	1.5834	0.70161
Zirconium Alkaline Spent Bath	2,500	95.2	42.3	0.238	0.10575
Titanium Alkaline Spent Bath	10,800	14.3	6.34	0.15444	0.068472
Zirconium Alkaline Rinse	2,500	187	82.9	0.4675	0.20725
Titanium Alkaline Rinse	10,800	16.4	7.29	0.17712	0.078732
Zirconium Grind Cooling	700	19.1	8.48	0.01337	0.005936
Zirconium Grind Rinse	700	10.7	4.75	0.00749	0.003325
Zirconium Inspection	700	0.917	0.407	0.0006419	0.0002849
Titanium Grind	1350	28.3	12.6	0.038205	0.01701
Titanium Miscellaneous	1600	1.93	0.856	0.003088	0.0013696
Total Fluoride Limitations				3.1181749	1.3826105

BAT EFFLUENT LIMITATIONS FOR LEAD

Source	Daily Prod. in Off-lbs.	Lead Allotment per million Off-lbs.		Allowed SSM Discharge in lbs./day	
		Maximum Daily	Monthly Average	Maximum Daily	Monthly Average
Zirconium Surface Treatment Bath	4,400	0.143	0.068	0.0006292	0.0002992
Titanium Surface Treatment Bath	9,100	0.087	0.042	0.0007917	0.0003822
Zirconium Etch Rinse	4,400	0.373	0.178	0.0016412	0.0007832
Titanium Etch Rinse	9,100	1.23	0.584	0.011193	0.0053144
Zirconium Alkaline Spent Bath	2,500	0.672	0.32	0.00168	0.0008
Titanium Alkaline Spent Bath	10,800	0.101	0.048	0.0010908	0.0005184
Zirconium Alkaline Rinse	2,500	1.32	0.628	0.0033	0.00157
Titanium Alkaline Rinse	10,800	0.116	0.055	0.0012528	0.000594
Zirconium Grind Cooling	700	0.135	0.064	0.0000945	0.0000448
Zirconium Grind Rinse	700	0.076	0.036	0.0000532	0.0000252
Zirconium Inspection	700	0.006	0.003	0.0000042	0.0000021
Titanium Grind	1350	0.2	0.095	0.00027	0.00012825
Titanium Miscellaneous	1600	0.014	0.006	0.0000224	0.0000096
Total Lead Limitations				0.022023	0.01047135

BAT EFFLUENT LIMITATIONS FOR ZINC

Source	Daily Prod. in Off-lbs.	Zinc Allotment per million Off-lbs.		Allowed SSM Discharge in lbs./day	
		Maximum Daily	Monthly Average	Maximum Daily	Monthly Average
Zirconium Surface Treatment Bath	4,400	0.497	0.208	0.0021868	0.0009152
Titanium Surface Treatment Bath	9,100	0.304	0.127	0.0027664	0.0011557
Zirconium Etch Rinse	4,400	1.3	0.542	0.00572	0.0023848
Titanium Etch Rinse	9,100	4.27	1.78	0.038857	0.016198
Zirconium Alkaline Spent Bath	2,500	2.34	0.976	0.00585	0.00244
Titanium Alkaline Spent Bath	10,800	0.351	0.147	0.0037908	0.0015876
Zirconium Alkaline Rinse	2,500	4.59	1.92	0.011475	0.0048
Titanium Alkaline Rinse	10,800	0.403	0.169	0.0043524	0.0018252
Zirconium Grind Cooling	700	0.469	0.196	0.0003283	0.0001372
Zirconium Grind Rinse	700	0.263	0.11	0.0001841	0.000077
Zirconium Inspection	700	0.023	0.009	0.0000161	0.0000063
Titanium Grind	1350	0.695	0.291	0.00093825	0.00039285
Titanium Miscellaneous	1600	0.047	0.02	0.0000752	0.000032
Total Zinc Limitations				0.07654035	0.031952

BAT EFFLUENT LIMITATIONS FOR NICKEL

Source	Daily Prod. in Off-lbs.	Nickel Allotment per million Off-lbs.		Allowed SSM Discharge in lbs./day	
		Maximum Daily	Monthly Average	Maximum Daily	Monthly Average
Zirconium Surface Treatment Bath	4,400	0.653	0.432	0.0028732	0.0019008
Titanium Surface Treatment Bath	9,100	0.087	0.042	0.0007917	0.0003822
Zirconium Etch Rinse	4,400	1.71	1.13	0.007524	0.004972
Titanium Etch Rinse	9,100	5.61	3.71	0.051051	0.033761
Zirconium Alkaline Spent Bath	2,500	3.07	2.03	0.007675	0.005075
Titanium Alkaline Spent Bath	10,800	0.461	0.305	0.0049788	0.003294
Zirconium Alkaline Rinse	2,500	6.03	3.99	0.015075	0.009975
Titanium Alkaline Rinse	10,800	0.53	0.351	0.005724	0.0037908
Zirconium Grind Cooling	700	0.617	0.408	0.0004319	0.0002856
Zirconium Grind Rinse	700	0.346	0.229	0.0002422	0.0001603
Zirconium Inspection	700	0.03	0.02	0.000021	0.000014
Titanium Grind	1350	0.914	0.605	0.0012339	0.00081675
Titanium Miscellaneous	1600	0.062	0.041	0.0000992	0.0000656
Total Nickel Limitations				0.0977209	0.06449305

BAT EFFLUENT LIMITATIONS FOR AMMONIA

Source	Daily Prod. in Off-lbs.	Ammonia Allotment per million Off-lbs.		Allowed SSM Discharge in lbs./day	
		Maximum Daily	Monthly Average	Maximum Daily	Monthly Average
Zirconium Surface Treatment Bath	4,400	45.3	19.9	0.19932	0.08756
Titanium Surface Treatment Bath	9,100	27.7	12.2	0.25207	0.11102
Zirconium Etch Rinse	4,400	119	52.1	0.5236	0.22924
Titanium Etch Rinse	9,100	389	171	3.5399	1.5561
Zirconium Alkaline Spent Bath	2,500	213	93.8	0.5325	0.2345
Titanium Alkaline Spent Bath	10,800	32	14.1	0.3456	0.15228
Zirconium Alkaline Rinse	2,500	419	184	1.0475	0.46
Titanium Alkaline Rinse	10,800	36.8	16.2	0.39744	0.17496
Zirconium Grind Cooling	700	42.8	18.8	0.02996	0.01316
Zirconium Grind Rinse	700	24	10.6	0.0168	0.00742
Zirconium Inspection	700	2.05	0.903	0.001435	0.0006321
Titanium Grind	1350	63.5	27.9	0.085725	0.037665
Titanium Miscellaneous	1600	4.32	1.9	0.006912	0.00304
Total Ammonia Limitations				6.98	3.07

BAT EFFLUENT LIMITATIONS FOR COPPER

Source	Daily Prod. in Off-lbs.	Copper Allotment per million Off-lbs.		Allowed SSM Discharge in lbs./day	
		Maximum Daily	Monthly Average	Maximum Daily	Monthly Average
Zirconium Surface Treatment Bath	4,400	0.646	0.34	0.0028424	0.001496
Titanium Surface Treatment Bath	9,100	0.395	0.208	0.0035945	0.0018928
Zirconium Etch Rinse	4,400	1.69	0.888	0.007436	0.0039072
Titanium Etch Rinse	9,100	5.55	2.92	0.050505	0.026572
Zirconium Alkaline Spent Bath	2,500	3.04	1.6	0.0076	0.004
Titanium Alkaline Spent Bath	10,800	0.456	0.24	0.0049248	0.002592
Zirconium Alkaline Rinse	2,500	5.97	3.14	0.014925	0.00785
Titanium Alkaline Rinse	10,800	0.525	0.276	0.00567	0.0029808
Zirconium Grind Cooling	700	0.61	0.321	0.000427	0.0002247
Zirconium Grind Rinse	700	0.342	0.18	0.0002394	0.000126
Zirconium Inspection	700	0.029	0.015	0.0000203	0.0000105
Titanium Grind	1350	0.905	0.476	0.00122175	0.0006426
Titanium Miscellaneous	1600	0.062	0.032	0.0000992	0.0000512
Total Copper Limitations				0.09950535	0.0523458

BPT EFFLUENT LIMITATIONS FOR TSS

Source	Daily Prod. in Off-lbs.	TSS Allotment per million Off-lbs.		Allowed SSM Discharge in lbs./day	
		Maximum Daily	Monthly Average	Maximum Daily	Monthly Average
Zirconium Surface Treatment Bath	4,400	14	6.63	0.0616	0.029172
Titanium Surface Treatment Bath	9,100	8.53	4.06	0.077623	0.036946
Zirconium Etch Rinse	4,400	364	173	1.6016	0.7612
Titanium Etch Rinse	9,100	1200	570	10.92	5.187
Zirconium Alkaline Spent Bath	2,500	65.6	31.2	0.164	0.078
Titanium Alkaline Spent Bath	10,800	9.84	4.68	0.106272	0.050544
Zirconium Alkaline Rinse	2,500	1,290	613	3.225	1.5325
Titanium Alkaline Rinse	10,800	113	53.8	1.2204	0.58104
Zirconium Grind Cooling	700	13.2	6.26	0.00924	0.004382
Zirconium Grind Rinse	700	73.8	35.1	0.05166	0.02457
Zirconium Inspection	700	0.632	0.301	0.0004424	0.0002107
Titanium Grind	1350	195	92.8	0.26325	0.12528
Titanium Miscellaneous	1600	1.33	0.632	0.002128	0.0010112
Total TSS Limitations				17.7032154	8.4118559

SANDVIK SPECIAL METALS
EFFLUENT LIMITATIONS,
CONVERSION FROM LBS/DAY TO
MG/L

MAXIMUM DAILY

FORMULA: (Daily mass ldg eff limit (lbs/day) ÷ Daily max flow (mgd)) ÷ Conversion factor (8.34 lbs/gal)

<u>Parameter</u>	<u>Maximum Daily, in lbs/day</u>	<u>Maximum Daily Flow, in mgd</u>	<u>Conversion Factor, 8.34 lbs/gal</u>	<u>Effluent Limitation, in mg/l (ppm)</u>
Chromium	0.023291	0.05	8.34	0.055853717
Cyanide	0.0143158	0.05	8.34	0.034330456
Flouride	3.1181749	0.05	8.34	7.47763765
Lead	0.022023	0.05	8.34	0.05281295
Zinc	0.07654035	0.05	8.34	0.18355
Nickel	0.0977209	0.05	8.34	0.234342686
Ammonia	6.978762	0.398	8.34	2.102467373
Copper	0.09950535	0.05	8.34	0.238621942

MONTHLY AVERAGE

FORMULA: (Monthly mass ldg eff limit (lbs/day) ÷ Monthly avg flow (mgd)) ÷ Conversion factor (8.34 lbs/gal)

<u>Parameter</u>	Monthly Average, <u>in lbs/day</u>	Long Term Average <u>Flow, in mgd</u>	Conversion Factor, <u>8.34 lbs/gal</u>	Effluent Limitation, <u>in mg/l (ppm)</u>
Chromium	0.0094325	0.05	8.34	0.022619904
Cyanide	0.00629235	0.05	8.34	0.015089568
Fluoride	1.3826105	0.05	8.34	3.31561271
Lead	0.06449305	0.05	8.34	0.154659592
Zinc	0.03195185	0.05	8.34	0.076623141
Nickel	0.01047135	0.05	8.34	0.025111151
Ammonia	3.0675771	0.251	8.34	1.465398406
Copper	0.0523458	0.05	8.34	0.125529496

Spreadsheet Calculations for TSS Interim Limitations

Date	SOLIDS, TOTAL SUSPENDED LBS/DAY AVG Value	SOLIDS, TOTAL SUSPENDED LBS/DAY MAX Value			LBS/DAY AVG Value	LBS/DAY MAX Value
1-Oct-00	7.09	16.26			7.09	16.26
1-Nov-00	6.25	7.09			6.25	7.09
1-Dec-00	7.5	11.67			7.5	11.67
1-Jan-01	15.01	19.18			15.01	19.18
1-Feb-01	8.34	10			8.34	10
1-Mar-01	8.46	15.01			8.46	15.01
1-Apr-01	12.92	18.34			12.92	18.34
1-May-01	13.27	24.59			13.27	24.59
1-Jun-01	9.59	14.17			9.59	14.17
1-Jul-01	13.82	23.34			13.82	23.34
1-Aug-01	13.58	18.76			13.58	18.76
1-Sep-01	11.73	15.01			11.73	15.01
1-Oct-01	9.67	14.59			9.67	14.59
1-Nov-01	10.73	14.17			10.73	14.17
1-Dec-01	19.43	41.69			19.43	outlier
1-Jan-02	27.93	32.51			outlier	32.51
1-Feb-02	23.86	45.85			outlier	outlier
1-Mar-02	15.63	33.76			15.63	33.76
1-Apr-02	21.09	29.6			outlier	29.6
1-May-02	13.85	22.51			13.85	22.51
1-Jun-02	9.07	11.67			9.07	11.67
1-Jul-02	6.82	18.34			6.82	18.34
1-Aug-02	5.94	7.92			5.94	7.92
1-Sep-02	7.58	14.59			7.58	14.59
1-Oct-02	5.84	8.75			5.84	8.75
2-Nov-02	10.53	12.51			10.53	12.51
3-Dec-02						
last two yr avg	12.3376	19.4248			95th percentile	99th percentile
stdv	5.727427	10.1789			15.568	33.4725
Limits of Previous Permit	11.89	25.02				
	95th percentile	99th percentile				
	23.31	44.85				

Calculation of Water Quality Based Limitations via Washington State Department
of Ecology's TSDCalc10.xls

SPREADSHEET CREATED BY D. NUNNALLEE, REV. 1-92 BY G. SHERVEY

Parameter	Acute Dil'n Factor	Chronic Dil'n Factor	Metal Criteria Translator Acute	Metal Criteria Translator Chronic	Ambient Conc. ug/L	Water Quality Standard Acute ug/L	Water Quality Standard Chronic ug/L	Average Monthly Limit (AML) ug/L	Maximum Daily Limit (MDL) ug/L
Lead	36	470	0.466	0.466	0.0096	34.1683	1.3315	1091.672	2190.101
Copper	36	470	0.996	0.996	0.55	9.85387	6.916	167.8988	336.8367
Chromium	36	470			0.27	341.296	110.71	6119.664	12277.2
Nickel	36	470	0.998	0.997	0.26	866.659	96.249	15578.36	31253.13
Zinc	36	470	0.996	0.996	1.8	70.0238	63.942	1230.057	2467.727

APPENDIX D -- RESPONSE TO COMMENTS

No comments were received by the Department of Ecology.